AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listing of claims in the Application. Please amend the claims to read as follows and cancel without prejudice or disclaimer the claims marked as canceled:

Listing of Claims

1.-17. **(Canceled)**

18. (New) A method for producing a first periodic output signal having a dominant spectral component at three times a local frequency less a first center frequency, from a first periodic signal having the local frequency, delayed versions of the first signal, and a first periodic input signal having the first center frequency, the method comprising:

producing a first periodic logic signal having relatively high spectral content at three times the local frequency and relatively low spectral content at other frequencies, from the first periodic signal and the delayed versions thereof using logic operations, wherein said first logic signal comprises eight periodic sections, and wherein said first, third, fourth, and fifth sections are at a first logic level and said second, fifth, seventh, and eighth sections are at a second logic level opposite said first logic level; and

producing the first periodic output signal by mixing the first periodic input signal with said first logic signal.

19. (New) The method of Claim 18, wherein the delayed versions comprise a second periodic signal having a phase of approximately 90 degrees relative to the first periodic signal and a third periodic signal having a phase of approximately 45 degrees relative to the first periodic signal.

20. (New) The method of Claim 19, wherein the delayed versions comprise a fourth periodic signal having a phase of approximately 135 degrees relative to the first periodic signal.

21. (New) The method of Claim 18, wherein at least one of the group consisting of: the first periodic signal, the delayed versions of the first periodic signal, said first logic

signal, the first periodic input signal, and the first periodic output signal is a differential signal.

22. (New) The method of Claim 18, comprising:
producing a second periodic logic signal having a phase of approximately 90 degrees relative to the first periodic logic signal, from the first periodic signal and the delayed versions thereof by means of logic operations; and
producing a second periodic output signal having a dominant spectral component at three times the local frequency less a second center frequency by mixing a second periodic input signal having said second center frequency with said second logic signal.

23. (New) The method of Claim 22, wherein at least one of the group consisting of: the first periodic signal, the delayed versions of the first periodic signal, said first logic signal, said second logic signal, the first periodic input signal, said second periodic input signal, the first periodic output signal, and said second periodic output signal is a differential signal.

24. (New) The method of Claim 18, comprising:
shaping the first periodic signal and the delayed versions thereof into logic signals for producing said first periodic logic signal, wherein the first periodic signal and the delayed versions thereof are substantially sinusoidal signals.

25. (New) The method of Claim 18, wherein the first periodic input signal is a radio frequency signal and mixing the first input signal with said first periodic logic signal comprises down converting the first input signal.

26. (New) The method of Claim 18, wherein the first periodic output signal is a radio frequency signal and mixing the first input signal with said first periodic logic signal comprises up converting the first input signal.

27. (New) A method for producing a periodic differential output signal having a dominant spectral component at three times a local frequency less a center frequency by mixing three periodic differential signals having the local frequency and a periodic differential input signal having the center frequency in a circuit comprising four branches, wherein each branch comprises three serially connected transistors, and wherein the second signal and the third signal are delayed from the first signal, the method comprising:

receiving a positive portion of the three signals in the first and the second branches, wherein in each branch the first transistor receives the positive portion of the first signal, the second transistor receives the positive portion of the second signal, and the third transistor receives the positive portion of the third signal;

receiving a negative portion of the three signals in the third and the fourth branches, wherein in each branch the first transistor receives the negative portion of the first signal, the second transistor receives the negative portion of the second signal, and the third transistor receives the negative portion of the third signal;

receiving a positive portion of the input signal in a first transistor connected to the first branch and the third branch and a negative portion of the input signal in a second transistor connected to the second branch and the fourth branch; and

producing a positive portion of the output signal from the first branch and the fourth branch and a negative portion of the output signal from the second branch and the third branch.

28. (New) The method of Claim 27, wherein the second periodic signal has a phase of approximately 90 relative to the first periodic signal and the third periodic signal has a phase of approximately 45 degrees relative to the first periodic signal.

29. (New) The method of Claim 27, wherein the third periodic signal is the average of the first periodic signal and the second periodic signal.

30. (New) The method of Claim 27, wherein the periodic input signal is a radio frequency signal and mixing the input signal with the three periodic signals comprises down converting the input signal.

31. (New) The method of Claim 27, wherein the periodic output signal is a radio frequency signal and mixing the input signal with the three periodic signals comprises up converting the input signal.

32. (New) A method for producing a periodic differential output signal having a dominant spectral component at three times a local frequency less a center frequency by mixing three periodic differential signals having the local frequency and a periodic differential input signal having the center frequency in a circuit comprising a ring having four branches connected by nodes, wherein each branch comprises three stacked transistors, and wherein the second signal and the third signal are delayed from the first signal, the method comprising:

receiving a positive portion of the three signals in the first branch and the second branch opposite thereto, wherein in each branch the first transistor receives the positive portion of the first signal, the second transistor receives the positive portion of the second signal, and the third transistor receives the positive portion of the third signal;

receiving a negative portion of the three signals in the third branch and the fourth branch opposite thereto, wherein in each branch the first transistor receives the negative portion of the first signal, the second transistor receives the negative portion of the second signal, and the third transistor receives the negative portion of the third signal;

receiving a positive portion of the input signal in the node connecting the second branch and the third branch and a negative portion of the input signal in the node connecting the first branch and the fourth branch; and

producing a positive portion of the output signal from the node connecting the first branch and the third branch and a negative portion of the output signal from the node connecting the second branch and the fourth branch.

33. (New) The method of Claim 32, wherein the second periodic signal has a phase of approximately 60 degrees relative to the first periodic signal and the third periodic signal has a phase of approximately 120 degrees relative to the first periodic signal.

34. (New) The method of Claim 32, wherein the periodic input signal is a radio frequency signal and mixing the input signal with the three periodic signals comprises down converting the input signal.

35. (New) The method of Claim 32, wherein the periodic output signal is a radio frequency signal and mixing the input signal with the three periodic signals comprises up converting the input signal.